# Glacial lake outburst hazard in the Russian Caucasus: identification and forecast

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Current glacier retreat in the Caucasus leads to the growing number of proglacial lakes which threaten outburst to mountain valleys. Our investigations in the region aim at assessment of outburst hazard and vulnerability of settlements and infrastructure to potential debris flows and floods.

We have identified several dozen of such lakes in the Russian Central Caucasus and determined the "hot spots" with the highest hazard. These are mostly located in the Genaldon, Adyl-Su and Malka River valleys. In the Genaldon River valley 13 new lakes formed after the 2002 Kolka-Karmadon glacial disaster. The volume of lakes reached more than 5 M $m^3$ in 2002 but later most of it drained. In the Adyl-Su River valley near the terminus of the Bashkara Glacier, there is a group of three dangerous lakes with a total volume of about 1 M $m^3$. We carry out annual monitoring of their condition through bathymetric and geodetic surveys.

In July 2006 we identified a large (550,000 $m^3$) dammed glacial lake by Birdzhaly-Chiran and Chungurchat-Chiran glaciers in the Malka River valley at the north-east slope of Mt. Elbrus. It was in a critical state nearing an outburst. We informed regional authorities and managers of the Dzhily-Su mineral water resort about the possible disaster. The outburst occurred on 11 August 2006, releasing about 400,000 $m^3$ of water over one or two days, and destroying the resort infrastructure. We made field observations and stereosurveys of the lake before and after the outburst. The area has several proglacial lakes remaining and glaciers there are retreating quickly, calling for further monitoring.